

Precise Measurement for Manufacturing

A metrology instrument known as PhaseCam™ supports a wide range of applications, from testing large optics to controlling factory production processes. This dynamic interferometer system enables precise measurement of three-dimensional surfaces in the manufacturing industry, delivering speed and high-resolution accuracy in even the most challenging environments.

PhaseCam originated from a prototype interferometer that was being developed by MetroLaser, Inc., in 1999. During that time, Philip Stahl, a NASA engineer at Marshall Space Flight Center, learned of the technology while touring the company's facility, and immediately recognized its applicability to testing large astronomical mirrors and space optical systems. MetroLaser proposed building a system to NASA specifications for testing large optics in a vibrating environment. The technology would, among others, benefit NASA's Advanced Mirror System Demonstrator project for the James Webb Space Telescope.

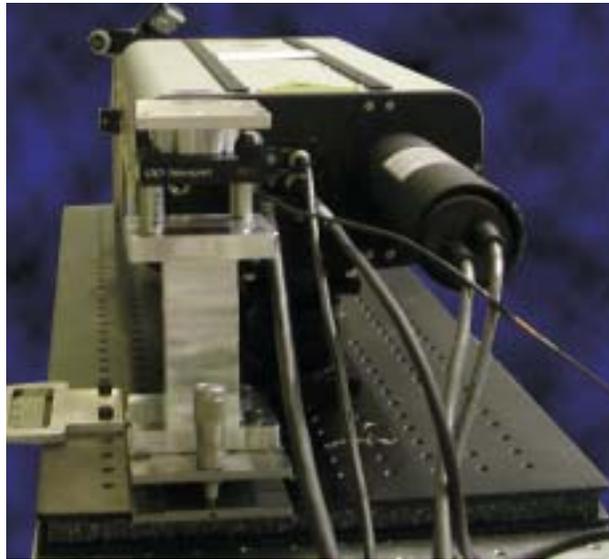
In January 2000, 4D Vision Technology, Inc., was formed to commercialize the PhaseCam technology, with NASA becoming the firm's first customer. Just 6 months after NASA granted 4D Vision a contract, the company delivered its first PhaseCam system. Stahl stated that the company "took a task that was thought to be impossible and successfully accomplished it in less time and for less money than any of its competitors." As a result of the company's excellent work, NASA invited 4D Vision to present its new product at Technology Days 2001, an annual symposium held at Marshall to discuss the progress of various optics projects by NASA, contractors, and universities. This provided the company the opportunity to introduce PhaseCam to many potential customers in the commercial marketplace. In 2002, 4D Technology Corporation, of Tucson, Arizona, acquired 4D Vision as part of its mission to become a world leader in dynamic optical metrology products and services.

PhaseCam satisfies industry demands to produce accurate measurements where vibration and motion are intrinsic components of the manufacturing process, and yield and throughput are paramount. With this product, vibrations, moving parts, air turbulence, and other impediments are no longer a serious barrier to interferometric testing. Unlike phase-shifting interferometers, the

system works by capturing data in a single frame, measuring data rates in tens of microseconds. By using a single camera to record four data frames at the exact same time, PhaseCam eliminates critical alignment issues and simplifies calibration. No matter how much vibration is present, all of the data represent the same instant in time.

Compact and reliable, PhaseCam enables users to make interferometric measurements right on the factory floor. The system can be configured for many different applications, including mirror phasing, vacuum/cryogenic testing, motion/modal analysis, and flow visualization. Customers include leading aerospace and optical manufacturers such as Eastman Kodak Company, Ball Aerospace & Technologies Corporation, and the University of Arizona Mirror Laboratory. NASA continues to use the technology to test mirror technologies for next-generation space telescopes. According to Stahl, "Not only did NASA get a great interferometer to enable the testing of large mirrors, but the taxpayer received great value. I believe that this type of proactive investment is an example of the government at its best."

PhaseCam™ is a trademark of 4D Technology Corporation.



The original PhaseCam™ system tested a composite mirror for Marshall Space Flight Center.